PURUSHOTH VELAYUTHAN

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RESEARCH INTERESTS

- Audio Representation Learning
- Tokenization & Codecs
- LLMs/VLMs
- Foundation Models

EDUCATION

University of Nevada, Reno **Expected Graduation: May 2027**

Master's in Computer Science (Reading): GPA: 4.0 / 4.0

Key Courses: Convex optimization, Cloud Computing, Deep Learning, Gen AI: From Images to Video, Computer Graphics

National Institute of Technology Tiruchirappalli, India **Aug 2018 – May 2022**

B.Tech major in Electrical and Electronics Engineering and minor in Computer Applications (First Class)

RESEARCH EXPERIENCE

Idaho National Laboratory, INL **June 2026 – August 2026**

AI/ML Research Intern *Idaho Falls, Idaho*

- Developing signal grammar–based representation learning for Open Set Recognition and unknown RF waveform detection.
- Building a multi-stage framework comprising cross-SNR temporal representation learning, low-SNR-stable RF tokenization, and uncertainty-aware grammar modeling.
- Trained models across INL's large-scale HPC infrastructure, spanning multiple clusters with multi-GPU compute nodes.

Human–Machine Perception Lab, UNR **January 2025 – Present**

Graduate Research Assistant *Reno, Nevada*

- Implemented Audio AI agents for UNR's Nursing school for nursing and clinical assistance, including automated EHR documentation and nursing evaluations.
- Proposed the first hyperbolic text–image retrieval approach on the CBIS-DDSM breast cancer benchmark, achieving Recall@1 = 69.72 and Recall@10 = 78.47, outperforming Euclidean embedding baselines

University of Moratuwa **July 2024 – December 2024**

Research Assistant (Department of Computer Science & Engineering) *Colombo, Sri Lanka*

- Designed and evaluated OCR benchmarking experiments for Sinhala and Tamil, analyzing accuracy, robustness, and failure case.
- Built an OMR-based MCQ auto-grading system for handwritten bubble responses, deployed department-wide and continuously used in production since 2024.

University of Colombo School of Computing(UCSC) **November 2022 – March 2023**

Research Assistant(UAVR Lab) *Colombo, Sri Lanka*

- Curated a multispectral UAV dataset for marine debris detection to support environmental monitoring and downstream ML research.
- Implemented multimodal fusion based technique to combine both multispectral images and MmWave captures.
- Improved Faster R-CNN marine debris detection accuracy by 6.7% with 65% less labeled data using self-supervised pretraining.

Indian Space Research Organisation (ISRO) **August 2021 – May 2022**

Undergraduate Researcher *Thiruvananthapuram, India*

- Developed a real-time facial emotion recognition system for satellite ships using computer vision, designed to operate robustly across pose variations, occlusions, and challenging lighting conditions.
- Enhanced robustness in different body rotations, particularly planar 2D rotations.
- Improved the state-of-the-art (SOTA) model's performance by 7.9% under controlled environments.

SELECTED PUBLICATIONS & POSTER

Sinhala Audio Embedding Benchmark and Evaluation
Purushoth Velayuthan, Tharindu Ranasinghe
Under Review at NAACL 2027 (CORE Rank A)

Large-scale Multilingual News Image Captioning with LLMs
Yuji Chen, **Purushoth Velayuthan**, Alistair Plum, Hansi Hettiarachchi, Saroj Basnet, Menan Velayuthan, Marcos Zampieri, Tharindu Ranasinghe
Accepted at EMNLP 2026 (CORE Rank A*)
Paper

From Complex Numbers to RF Grammar
Purushoth Velayuthan, Anna Quach
Poster

Evaluating Robustness of Vision-Language Models under Noisy Conditions.
Purushoth Velayuthan, Alireza Tavakkoli
Accepted at CCWC 2026 IEEE 16th Annual Computing and Communication Workshop and Conference
arxiv

GADS: A Super Lightweight Model for Head Pose Estimation
Menan Velayuthan, Asiri Gawesha, **Purushoth Velayuthan**, Pradeepa Samarasinghe, Dharshana Kasthurirathna
Manuscript can be found in the below link
arxiv

INDUSTRY EXPERIENCE

Pekoe.ai **March 2023 – May 2024**
Artificial Intelligence Engineer *Singapore-Hybrid*

- Improved image retrieval performance by 14% by enhancing VLM vision encoders over a vision-only baseline.
- Fine-tuned large language models to generate attribute-controlled image-difference captioning.
- Built scalable OCR and object-tracking pipelines for real-time product recognition on industrial production lines.
- Integrated and calibrated industrial camera feeds (e.g., Baumer) into AI workflows for automated monitoring and data capturing.
- Developed a 'Blendmix' augmentation technique for self-supervised training stratergies.
- Proficient in developing and implementing advanced speech technology solutions (speech-to-text and text-to-speech)

LIRNEasia. Inc **April 2021 – July 2021**
AI Research Intern *Colombo, Sri Lanka*

- Built a reference dataset for Sri Lanka, covering multiple classes of land covers and land use.

AWARDS AND ACHIEVEMENTS

Awarded for Graduate Dean's Merit Scholarship for academic session **2025 / 2026**
- For outstanding academic record and promise of productive scholarship

Awarded for Rajiv Gandhi Scholarship for academic session **2018 / 2019**
- For the best mathematical results in G.C.E Advanced Level

Sri Lankan Mathematics Olympiad **2012**
- Selected for the district level competition

TEACHING AND MENTORING

Lead Instructor – University Nevada Reno.
GRAD778–Elements of Research Computing (Large Language Models) (Spring 2026)

Teaching Assistant – University Nevada Reno.
CS687–Fundamentals of Deep Learning (Spring 2026)

Teaching Assistant– University Nevada Reno.
CS657–Database Management Systems (Fall 2025)

AI Engineer, Pekoe.ai
Mentored eight AI Engineer interns from the University of Moratuwa, Sri Lanka, during my tenure.

TECHNICAL SKILLS

Programming Languages	Python, C, C++, Matlab
ML Frameworks	Pytorch, Tensorflow, Keras, Scikit-learn, Open-CV, Hugging Face
LLM & AI Frameworks	LlamaIndex, LangChain, LangGraph, Ollama
HPC & Computing	Slurm, Linux, Multi-GPU Computing, HPC Clusters
Cloud & Development	AWS(Sagemaker, Lambda), Git*, LaTeX